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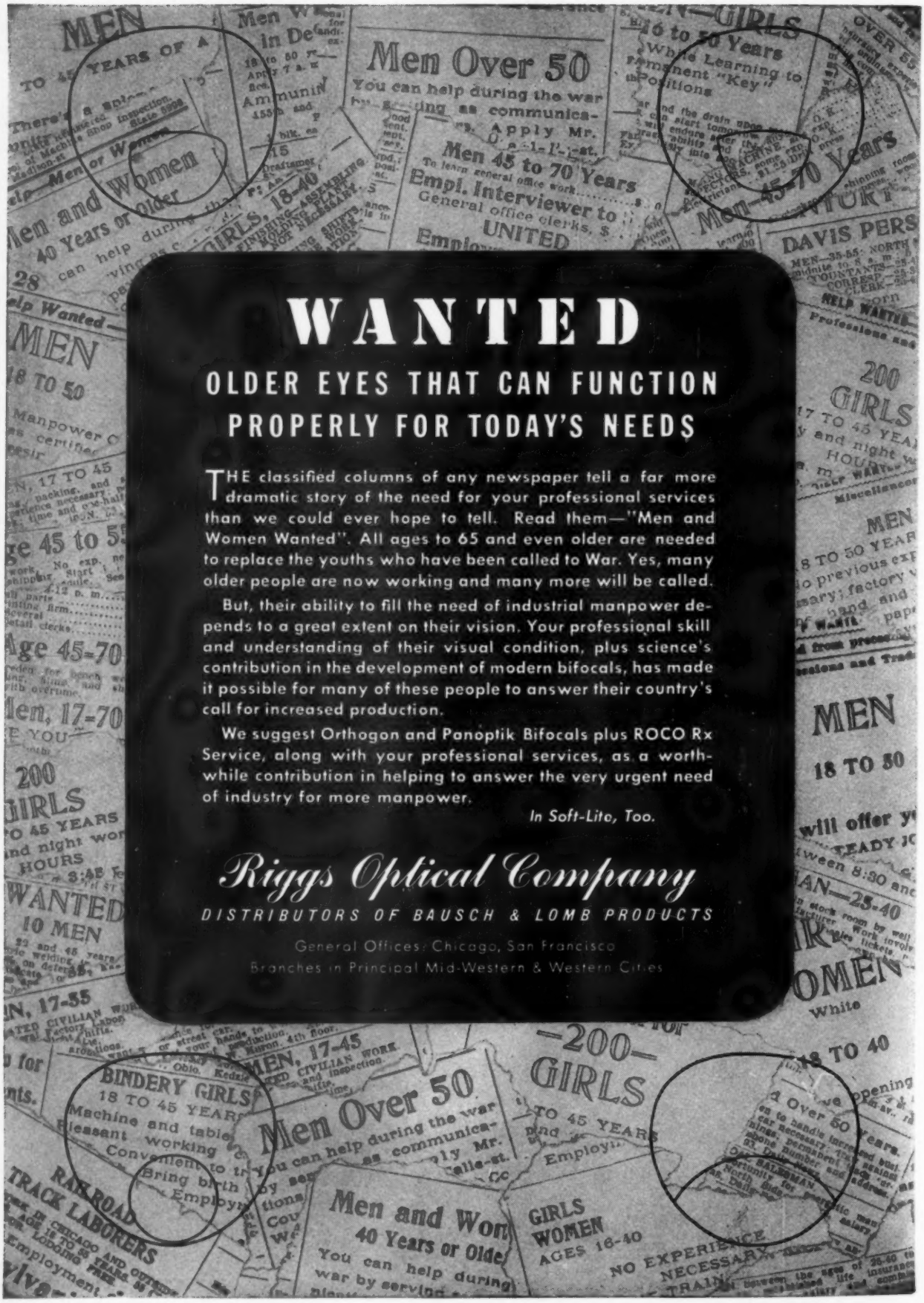
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OPHTHALMOMETRY THROUGH THE CORRECTION LENS*

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and
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New York, N. Y.

The basic difference between this and all other ophthalmometric techniques is that the object here is to ascertain the correction for the *total* astigmia by actually using lenses in combination with the ophthalmometer. The technique is predicated upon the assumption that the eye with a half-diopter with-the-rule astigmia is an eye in whose total refraction there is no effective cylindrical residue.

An outline of this technique, submitted as a subject for further research and substantiation, follows:

Since its inception more than a century ago, opththalmometry has been confined clinically to the measurement of the radius of curvature of the anterior surface of the cornea.

Attempts have been made to measure in a somewhat similar way the radii of curvature of both surfaces of the crystalline lens; but no clinically applicable method has won general approval.

From Kohlrausch, 1840, through Helmholtz, Donders, Coccius, Javal and Schjötz, to the latest designers, attention has been directed exclusively toward improving the means for applying the catoptric law upon which ophthalmometry is based.

While some progress has been made toward measuring the refractive index of the living cornea, ophthalmometers are still calibrated on estimated indices of refraction. Furthermore, different designers use different indices, and practitioners use different rules and tables for translating the ophthalmometric reading into the correction cylinder. The later tables appear to be an improvement over the earlier rules but they leave the cor-

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rection cylinder an estimated product not subject, heretofore, to direct approximation nor verification by the ophthalmometer.

The authors conceived and developed what they believed to be an original technique whereby trial lenses were employed in combination with the ophthalmometer to approximate the correction cylinder directly, instead of depending upon rules or tables of estimates, and to verify a correction cylinder previously ascertained by means other than the ophthalmometer.

That this technique was not *infallibly* effective did not need stressing inasmuch as no one, acquainted with the vagaries of the human binocular organism, would look for infallibility in this or in any other optometric technique.

But it could be said of this technique that it actually "worked" with sufficient effectiveness to deserve critical evaluation.

Consequently, this report is published at this time to open another promising field of research in Optometry.

In order to simplify its description, the technique will be presented just as the authors applied it, viz., empirically. After that, the premises upon which the technique was based will be discussed. And lastly, some of its very obvious shortcomings as well as some of its further potentialities will be set forth as constituting a rational point at which to discard empiricism and engage scientific research.

EMPIRIC TECHNIQUE NO. 1

The object was to approximate directly with the ophthalmometer the cylinder which corrected the *total* astigmia of an eye.

Step 1. The ophthalmometric astigmia was measured in the usual way.

Step 2. The cylinder thus indicated was set, with its curved surface as close to the eye as the lashes permitted, *not* in the usual way but with its axis coinciding with the meridian of *greatest* power. This sets the axis of the trial lens at right angles to that at which it will be worn ultimately as the correction cylinder.

Step. 3. The ophthalmometric astigmia was measured again but this time through the trial cylinder and always in the horizontal and vertical meridians. This point warrants emphasizing: Whether the primary and secondary meridians of the cornea were horizontal and vertical or oblique, i.e., whether the axis of the trial cylinder in use be set hori-

zontal or vertical or oblique, the ophthalmometer must be set to measure the horizontal and vertical meridians.

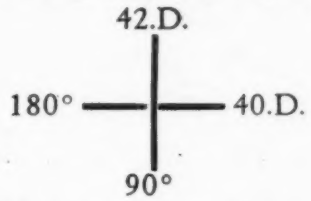
Sept. 4. If this trial cylinder did not keep or bring the principal meridians horizontal and vertical, its axis was swung until the obliquity of the principal meridians of the residual astigmia was eliminated. And, if through this trial cylinder more or less than a half-diopter of with-the-rule astigmia were disclosed by the ophthalmometer, the power of the cylinder was modified until that amount and kind of astigmia did appear.

Step 5. The trial lens through which the ophthalmometer disclosed a half-diopter with-the-rule astigmia in the horizontal and vertical meridians was considered, after its axis was reversed 90 degrees, a rational approximation of the *total* (not merely the corneal) astigmia.

These steps may be illustrated by citing simple examples. In the first, the principal meridians of the initial ophthalmometric astigmia were horizontal and vertical. In the second, the principal meridians were oblique.

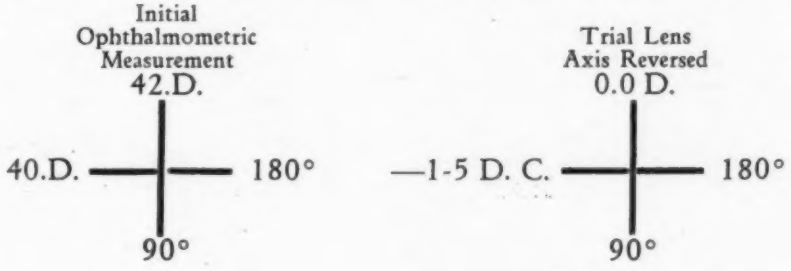
Example 1:

Step 1. The initial ophthalmometric measurement registered 40.D. in the primary and 42.D. in the secondary principal meridian, which were horizontal and vertical, respectively. Age of patient, 45 years.



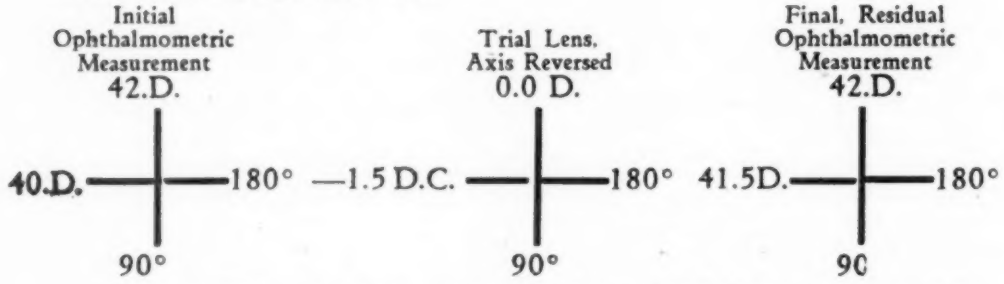
Such a reading called for a —1.50 D.C. axis 180°, according to Neumueller, Ryer-Hotaling tables.

Step 2. Accordingly, a —1.50 D.C. axis 90° (note the right-angled reversal of the axis) was set before the eye with its curved surface as close to the eye as the lashes permitted. The situation then was:



Step 3. The ophthalmometer was set to measure the horizontal and vertical meridians, and the astigmia was measured again, but now through the trial lens.

Step 4. If the principal meridians of the residual astigmia, thus measured, were found to be horizontal and vertical, the axis of the trial lens was considered correct. If the power of the residual astigmia were *not* a half-diopter with-the-rule, the power of the trial lens was modified until that result was obtained. If, however, the power of the residual astigmia were a half-diopter with-the-rule, the power of the trial lens was considered to be the power that should be used in the correction lens. In that case, the situation was:

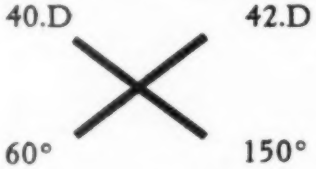


Step 5. Thus, in this example, as the —1.50 D.C. axis 90° trial lens left a residual ophthalmometric astigmia of a half-diopter with-the-rule, a —1.50 D.C. axis 180° was considered a reasonably close approximation of the *total* astigmia.

Incidentally, this approximation was assumed, empirically of course, to have embodied allowances for the half-diopter physiologic astigmia associated with the forty-fifth year, and for the change in effective power that a minus cylindrical value undergoes as it is transformed from the corneal plane to a plane 13.75 mm. from the cornea.

Example 2:

Step 1. The initial ophthalmometer measurement registered 40.D. in meridian 150° and 42.D. in meridian 60°. Age of patient 45 years.



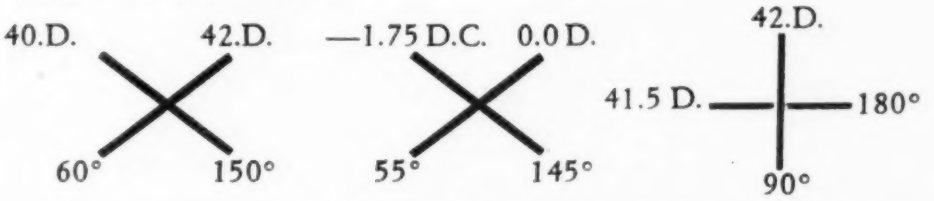
Such a reading would have called for a —1.50 D.C. correction lens had the principal meridians been horizontal and vertical. But, being

oblique, the estimated correction, according to the Neumueller table, might be considered of the order of —1.8 D.C. axis 143°.

Step 2. Accordingly, a —1.75 D.C. axis 53° (50° or 55° tentatively) was set before the eye with its curved surface just clearing the lashes. The situation then was:

Step 3. Regardless of the obliquity, and of the different degrees of obliquity, in the corneal astigmia and the trial cylinder, the residual astigmia was measured through this oblique-axis trial cylinder with the ophthalmometer reset to measure in the *horizontal* and *vertical* meridians.

Step 4. If the principal meridians of the residual astigmia, thus measured, were found to be horizontal and vertical, the axis of the trial cylinder (53°) was considered correct. If the principal meridians were found *not* to be horizontal and vertical, the lens (not the ophthalmometer) was swung until they did coincide. If the power of the residual astigmia were found to be 0.50 D., the power of the correction cylinder was considered correct. If, however, the power of the residual astigmia were found *not* to be 0.50 D., the power of the trial cylinder was modified until that result was obtained. In brief, the situation sought was as follows:



Step 5. Thus, in this example, as the —1.75 D. C. axis 55° trial lens left a residual ophthalmometric astigmia of a half-diopter with-the-rule, in meridians horizontal and vertical, a —1.75 D.C. axis 145° was considered a reasonably close approximation of the *total* astigmia.

This entire technique may be summarized briefly, as follows: By using trial lenses in combination with the ophthalmometer, the *total* astigmia may be approximated by, first, finding the trial cylinder which

reduces the ophthalmometric astigmia to a half-diopter, with-the-rule, in the horizontal and vertical meridians, and, then, reversing its axis 90 degrees.

EMPIRIC TECHNIQUE NO. 2

The object was to verify the correction cylinder being worn, or about to be prescribed, by subjecting its effect to direct ophthalmometric measurement.

This verification was not limited to the ophthalmometric reading but embraced the verification of the effectiveness of the cylinder being worn in correcting the *total* astigmia.

Step 1. The patient's lens was held before his eye with its axis swung 90° from the wearing, or prescribed, position.

Step 2. With the ophthalmometer set to measure in the horizontal and vertical meridians, the residual astigmia was measured through the correction lens, set as stated in Step 1.

Step 3. The correction lens was considered an accurate correction of the *total* astigmia if, in Step 2, a residual half-diopter with-the-rule astigmia, in meridians horizontal and vertical, were disclosed.

If the power or the principal meridians, or both, of the residual astigmia varied from 0.5 D., and 180° and 90°, respectively, the need for modification of the correction lens was considered.

This technique enjoyed the advantage of using the patient's own lens which included any spherical element his ametropia may have called for. Hence it was presumed to embody allowances for not only the physiologic astigmia and the distance of the lens from the cornea, but for the spherical ametropic component as well.

Step 4. In any case, the cylindrical component of any correction was considered accurate only when through it, with its axis reversed 90°, the ophthalmometer disclosed a half-diopter with-the-rule astigmia in the horizontal and vertical meridians.

PREMISES UPON WHICH THE FOREGOING TECHNIQUES WERE PREDICATED

In 1938 the authors conceived the possibility of using cylindrical trial lenses in combination with the ophthalmometer.

It was a simple matter to demonstrate: (1) that the cornea could be viewed, and measured, through cylindrical correction lenses placed,

slightly tilted, at the usual wearing position; (2) that a cylindrical lens changed the value of the cornea in the power meridian of the cylinder; (3) that toric (aspherical) readings could be changed to spherical readings; and (4) that the principal meridians, as well as their relative dioptric values, of an aspherical cornea could be modified ophthalmometrically by altering the power and axis of the correction cylinder.

Yet, simple as all this appeared, once it was mentioned, it seemed never to have been done before.

An hypothesis immediately suggested itself, as follows:

Experience and statistics seemed to have established, as firmly as such things could be established in relation to a thing as characteristically subject to changes as the binocular organism, that an eye with a half-diopter with-the-rule corneal astigmia was an eye *totally* without astigmia.

If, for example, the ophthalmometer registered a slightly higher refracting power in the vertical than in the horizontal meridian of the anterior surface of the cornea, it was assumed that a correspondingly higher refractive power existed in the horizontal than in the vertical meridian of the media posterior to this plane.

If the corneal or, more properly, ophthalmometric with-the-rule astigmia equalled in effective power the internal or physiologic against-the-rule astigmia, they represented two cylinders, crossed at right angles, of equal power and like sign, which offset each other and freed the eye's total refracting system from astigmia.

Conversely, the authors concluded, any eye could be considered properly corrected which had been brought to the point where it disclosed ophthalmometrically a half-diopter with-the-rule astigmia, principal meridians horizontal and vertical. That was the criterion whether the eye initially was astigmic with-the-rule, astigmic against-the-rule, astigmic with principal meridians horizontal and vertical, or astigmic with principal meridians oblique.

The techniques outlined above were predicated, empirically, upon that hypothesis. Such experimentation as was carried out had to be part of active clinical practice hence it was spasmodic, empiric and pragmatic in the sense that if it "worked"—well and good—if it did not—on with the case.

But even such experimentation made it clear that these techniques

were worth proper investigation and development. Indications were not absent of serious difficulties lying in the way of development to the point of clinical usefulness. As a basis for further development, the advantages and disadvantages will be reviewed.

PROS AND CONS OF OPHTHALMOMETRY THROUGH THE CORRECTION LENS

The degree to which these techniques were to be trusted depended directly upon the frequency with which the presence of a low-power with-the-rule astigmia on the cornea indicated the absence of astigmia from the *total* refraction of an eye.

The authors' first step was directed toward ascertaining what cylindrical corrections had been called for by eyes in which a half-diopter with-the-rule astigmia had been disclosed by the ophthalmometer.

It was decided, in this first survey, to include only those cases wherein the principal meridians of the corneal astigmia were exactly horizontal and vertical. As a previous compilation had shown that in only slightly over 56 per cent of 5,124 eyes were the principal meridians exactly horizontal and vertical, including *all* dioptric powers, it was readily appreciated that relatively few cases were to be expected wherein exactly a half-diopter of astigmia existed, with-the-rule, and in exactly the horizontal and vertical meridians.

Thus, among some 10,000 eyes were found 1, 638 in which the ophthalmometer had registered exactly a half-diopter with-the-rule astigmia in the horizontal and vertical meridians. These were selected from cases which had been examined and prescribed for not less than three times, over at least as many years, and whose reports of comfort, as well as their repeated visits, corroborated the assumption that their corrections represented accurate ones. Incidentally, all the records used antedated the conception of the techniques based upon the relationships involved:

If the results thus tabulated indicated nothing more, they did indicate that this novel use of the ophthalmometer in combination with trial cylinders in approximating the *total* astigmia possesses sufficient merit to warrant definitive scientific investigation and development.

It became obvious that could some known quantity of residual ophthalmometric astigmia be established as a clinically practicable criterion, the ophthalmometer, applied by this technique, would be par-

ticularly useful in oblique astigmia, whose correction cylinder is difficult to estimate by any rule or table.

Actual correction cylinders worn by 1638 eyes in which the ophthalmometer registered exactly 0.5 D. with-the-rule astigmia in exactly the horizontal and vertical meridians.

	—Cyl. axis 90°						None	—Cyl. axis 180°					
Power Cylinder Worn	0.75	0.62	0.5	0.37	0.25	0.12	0.0	0.12	0.25	0.37	0.5	0.62	0.75
Number of Eyes	44	14	99	52	251	67	760	54	196	16	72	6	7
Percentages	2.7	0.87	6.04	3.18	15.32	4.03	46.4	3.3	12.0	0.97	4.4	0.36	0.43

53.73%

81.05%

85.2%

95.64%

Hence, the next step in the appraisal of this technique requires a more detailed analysis than the preceding tabulation affords, wherein no oblique astigmia cases were considered and no separation of cases into age groups was essayed.

Whether such an analysis would raise or lower the estimated dependability of this ophthalmometric technique could not be foretold; but it was not unreasonable to expect further corroborative evidence from statistics which took into consideration the different amounts of physiologic astigmia assigned to the three age-groups already recognized.

In the interest of simplicity and conciseness, only the half-diopter residual quantity has been mentioned, so far. This was justified because this quantity represents that which offsets the physiologic astigmia that has been assigned to cases between 30 and 60 years of age which, clinically, far outnumber younger and older cases.

But, if the currently accepted age groups were recognized, the criteria were a quarter-diopter with-the-rule residual astigmia, in meridians horizontal and vertical, in cases under 30; a half-diopter in cases between

30 and 60; and a three-quarter diopter in cases over 60 years of age.

Whether the spherical component of compound and mixed astigmia corrections should be used with the correction cylinder in this technique remained to be determined. It was used seemingly to advantage wherever it was found in the patient's own glasses.

The statistical basis upon which the present allowances for physiologic astigmia were established could be greatly broadened, and thereby strengthened, by utilizing the thousands of records now lying dormant in optometrists' files.

But over all such considerations the significant fact stands out that in a cross-sectional group of 1638 eyes in which the ophthalmometer disclosed a half-diopter with-the-rule astigmia in the horizontal and vertical meridians, no cylinder whatever was called for in 46.4 per cent of them. Inferentially, a half-diopter of physiologic astigmia, or internal astigmia of some sort, must have been present in these cases.

If a tolerance of an eighth-diopter each side of zero were allowed, 53.73 per cent of these cases conformed to the half-diopter corneal astigmia criterion. And if a three-quarter-diopter tolerance were allowed 95.64 per cent conformed.

Such percentages indicated at least that the technique is based upon a rational premise.

If it could be developed to meet clinical requirements, the following advantages might be expected:

(1) It would be fundamentally objective.

(2) It would save time and ameliorate the fatigue inherent in any comprehensive optometric procedure whether it were to approximate the cylinder with which to begin subjective tests or retinoscopy, or as a substitute for retinoscopy.

(3) It would eliminate the present necessity for reference to rules and tables of estimated values.

(4) It would afford visible evidence of the effect the correction lens would have if worn in the same position it occupied in the test.

(5) It would eliminate the rather complex calculations involved in cases of oblique astigmia wherein the problem of obliquely crossed cylinders arises.

But with the advantages went some disadvantages, as follows:

(1) Care had to be exercised to tilt the correction lens so as to

divert reflections from its surface from the line of vision.

(2) Lenses with a diameter of one and one-half inch were required and ordinary flat lenses caused less troublesome reflections than did the modern deep curve lenses. Cylinders with frosted sections could not be used.

(3) It was not easy to change correction lenses nor to change their axis settings, while keeping the patient's head immovable in the head-rest. (A device for accomplishing these results has been patented and could be made available if the technique were proved clinically sound and a sufficient demand created for such a device.)

(4) If the ametropia associated with the astigmia exceeded two-diopters, the exigencies of the case seemed to require that the spherical component be used with the cylindrical, yet to use two separate lenses complicated the operations. The patient's own compound lens was used without difficulty.

(5) If the corneal curvatures were high in refractive power and the ametropia one of high myopia, the effect of the high minus sphere (which was that of raising the plus reading of the cornea) was such as to take the case outside of the 51. D. measuring limit of the ophthalmometer. For example, to a 48. D. corneal meridian, not more than —3.D total extra power could be added, such as a —3.D. sphere alone, a —3.D. cylinder alone, or some compound correction within the —3.D. limit, such as a —2.D.S. ⌒ —1.D.C. In such cases plus cylinders could be used instead of minus, the effect of plus being to lower the plus reading of the cornea.

On the other hand, to a 39.D. corneal meridian a single sphere, or cylinder, or a combination as high as —12.D. could be added.

If the corneal curvatures were relatively high in refracting power, and the ametropia hypermetropic, all but extremely high cases would fall inside the measuring limits of the instrument.

If the corneal curvatures were relatively low, and the ametropia myopic, all but extremely high cases would fall inside the measuring limits.

(6) Finally, the trial cylinder whose principal meridians differ in thickness, caused some alteration in the clearness of the miral images in one meridian. This had to be accepted because the ophthalmometer must never be refocused between the primary and the secondary meridian reading.

Thus, with its disadvantages as well as its advantages enumerated, and with all its empiricism, the authors conclude that the foregoing represents an original contribution of no inconsiderable value, with which Optometry should be credited.

Having conceived the principle, and carried the practice to its present state, the authors feel it is not out of keeping to urge that the technique as here proposed be now subjected to scientific test by those prepared to conduct such test and either proved to be of no clinical value or carried to a state of clinical practicability.

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READABILITY OF COMIC BOOKS*

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Comic books and comic sections in newspapers are widely read, especially by children. It has been shown that children have an overwhelming interest in this kind of reading. According to Witty (15) and others (3), reading the comics is one of the children's favored activities in grades 4, 5, and 6. In fact, it is the most popular of all reading activities. In another report Witty (16) found that age, sex, grade (within grades 4, 5, and 6) and locality had little differential effect on general interest in comics. A similar trend was found for children in grades 7 and 8 (17). Comics seem to satisfy the grade child's desire and need for experiences that are exciting and adventurous. Furthermore, these elements seem to be more important to the child than humor.

Thorndike's analysis (8) indicates that the bulk of the vocabulary in comics is standard English although a number of slang words and slang meanings are present. About 90 per cent of the words fall in the commonest thousand of the Thorndike word list and therefore are relatively easy. The reading difficulty is estimated to be at about the 5th and 6th grade level.

Whether or not the reading of comics is approved, the fact remains that they are extremely popular and are widely read. Furthermore, it is suggested by Witty, on the basis of his survey (16), that there is no adequate basis for the strictures that are frequently made concerning the dire effects brought about by reading comics. This is fortunate since comics constitute a significant portion of the leisure reading of children. Presumably they will continue to be widely read. It would seem highly desirable, therefore, that the print in comics be made as readable as possible so that conditions favorable to hygienic vision may be maintained.

Among several factors which condition the readability of print are

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two which are outstanding: (a) visibility of the printed characters and (b) the optical total character of words. To grasp the relation of these factors to visual hygiene in reading comics it is necessary to note how comic books are usually printed. The tendency is to employ lettering of small size upon a poor quality of paper. Frequently the print is on a colored background which reduces the brightness contrast between print and paper. As demonstrated by Tinker and Paterson (12), this tends to produce illegibility. In most comics words are printed in all-capitals. This raises the question of type-form (lower-case versus all-capitals, italics, etc.) which determines to an important degree quickness and ease of perception in reading.

Let us discuss first the visibility of print in comic books. Luckiesh and Moss (4) have considered this item in some detail. They employed their visibility meter to measure visibility of lettering and other printed material in 24 representative comic books. On the average the print had only 36 per cent the visibility of standard 12 point book type. Several suggestions were made to improve visibility of print in comic books: (a) Small sized lettering should be abandoned and the character of lettering improved. (b) The practice of printing on dark-colored backgrounds should be discontinued. (c) A better quality of paper should be used. It was concluded that unless the print of comic books can be greatly improved in visibility, they should not survive. Luckiesh and Moss failed, however, to mention the undesirability of employing all-capital lettering in the print of comics. Desirable differentiation of the optical characteristics of words may be achieved by the use of lower-case letters but not by all-capitals.

Word-form, or the optical total characteristic of a word, furnishes important clues to quick and accurate perception of words in reading (Tinker, 9). Thus, the word "reproduce" has a different total shape (form) than the word "adequate" or "accepting." Although the length contributes some to the optical total form of a word in lower case printing, it is the characteristic pattern outlined by the succession of short letters with long letters projecting above and below the line that predominate in producing differentiation in word-forms.

Utilization of word-form clues aids perception in reading in at least two important ways. (a) It fosters the perception and reading of words as *units* rather than by letters or by syllables. (b) It promotes a more effective use of peripheral vision to the right of the fixation. Well defined word-forms, even though indistinctly seen in peripheral vision, can fre-

quently be recognized. Although foveal vision (the fixation area) constitutes the core of perception, peripheral vision supplements the former by furnishing premonitions of coming words and phrases (Tinker, 9). The form of printing (i.e., lower-case) which produces the clearest differentiation in word-forms should be employed.

The importance of word form as an aid in the reading of children is emphasized by Gates (2). Children, especially the good readers, soon become aware of the configuration of the word-form. Furthermore, experience usually improves the efficiency of this kind of observation. Quick perception of word-forms facilitates rapid reading. Gates concludes that "the development of a keen and quick eye for gross word-forms is highly desirable."

A survey of some of the more recent reports on the reading of all-capital versus lower case printing will indicate the greater efficiency of the lower-case print in which word-forms are much more prominent. Paterson and Tinker (7), in advocating the use of lower-case in headline composition for newspapers, refer to the importance of word-form as an aid in perception in reading. They illustrate what is meant by "word-form" by printing two lists of words in parallel columns, one in all-capitals and one in lower case such as the following:

STOPPED	**stopped**
CLOSED	**closed**
YESTERDAY	**yesterday**
BLACK	**black**
PLAY	**play**
TABLE	**table**
PSYCHOLOGY	**psychology**

Inspection of these words reveals that the shape of each word in all-capitals is a rectangle but that each word in lower-case has its characteristic optical form due to an alternation of short letters with ascenders and descenders. These suggestions concerning word-form are substantiated by Tinker (10) who found that total word-form is more potent in the perception of words in lower-case than in all-capital printing. In the later, perception appears to occur largely letter by letter.

Lower-case has several advantages over all-capitals. Tinker and Paterson (11) found that lower-case was read approximately 12 per cent faster than all-capital printing. In another study (6) they discovered

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that 90 per cent of the readers judged the lower-case to be more legible. Futhermore, 94 per cent of the readers (13) consider the lower-case to be the more pleasing kind of print. In a different kind of study, Breland and Breland (1) demonstrated that lower-case newspaper headlines are more legible than those printed in all-capitals.

All the evidence on the comparisons of lower-case versus all-capital printing points in one direction. Lower case printing is more legible, is read faster, and is consistently preferred over the all-capitals. The reason for this predominant advantage for the lower-case material is that the word-forms, which are prominent in lower-case printing, furnish important clues which facilitate word perception. Furthermore, these clues are employed to good advantage by both children and adults in their reading.

The inference is obvious. Comic books and comic strips should employ lower-case rather than capital lettering. A good example of how effective lower-case lettering in comics can be is furnished by *Santa Claus Funnies*, published by Dell Publishing Company, 1942. Engineering lettering of good quality is employed. This produces a script which is very similar to certain modernistic type faces such as Kabel Light. Both Paterson and Tinker (5) and Webster and Tinker (14) have shown that this kind of type is just as legible as the commonly used book types. Lower-case lettering could be employed, therefore, with the assurance that it has satisfactory legibility. Furthermore, economic factors would not be a consideration since lower-case takes no more space than all-capital lettering.

Summary and Conclusions

1. Comics are widely read and greatly enjoyed by children from the fourth grade on.

2. An effort should be made, therefore, to improve the readability of this material. The printers of comic books should be on the alert to maintain conditions of hygienic vision for readers of such books. This implies that the print should be such that it can be read easily, rapidly, and without discomfort.

3. The visibility of the print can be greatly improved by maintaining maximum brightness contrast between print and paper and by employing a satisfactory size of lettering.

4. The practice of employing all-capital letters for the script in

most comics is unfortunate because the word-forms or the optical total characteristics of words are largely undifferentiated under these conditions.

5. The use of lower-case letters in printing yields differential word-forms due to the irregular outline produced by the succession of ascenders, descenders and short letters in a word.

6. These word-forms furnish important clues to rapid and effective perception of words since they foster the reading of words as units rather than letter by letter which tends to occur with all-capital printing.

7. The use of lower-case lettering in comics would be highly desirable from the standpoint of hygienic vision. Lower-case is not only read more rapidly than all-capital printing but it is overwhelmingly preferred by readers.

8. All-capital printing can be replaced by lower-case without increase in cost of printing.

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AN EPOCHAL CONTRIBUTION TO OPHTHALMOMETRY

Optometry may be justly proud of such followers as Ryer and Hotaling, whose names will go down in optometric history as having made one of the most outstanding contributions to clinical ophthalmometry since Javal and Schjotz, some fifty years ago, introduced the ophthalmometer named after them.

This instrument freed ophthalmometry from laboratory limitations and placed it upon a sound clinical basis. Throughout the intervening years noteworthy improvements have been made in the three leading models—the Universal, the Keratometer and the Micromatic C-I.

Yet, important as these improvements are, they constitute changes

in the mechanical and structural nature of the instruments. No fundamental change in technique has been developed.

All improvements aim at increasing the accuracy of measuring the curvature of the anterior surface of the cornea, ascertaining the sphericity or asphericity of that curvature, locating the principal meridians of curvature of the aspherical cornea, and from these measurements estimating by some rule the correction lens that may be called for.

From the classic Javal Rule, we progressed to the rule of Sutcliffe, to that of McCulloch and finally to that, with its tables, of Neumueller.

The fact that the ophthalmometric measurement is made at the corneal surface while the correction lens must be worn at some distance from that surface, makes it imperative that some rule be followed which allows for such factors as internal or physiologic astigmia, change in effective power of a lens set in a plane considerably removed from the plane of measurement, and the effect the spherical ametropic correction lens has, in combination, upon the cylindrical astigmic correction lens.

The Neumueller rule takes all these factors into consideration but even so the ophthalmometric correction lens, by this or any other rule, remains a more or less abstract finding, *not subject to corroboration by the ophthalmometer.*

This point should be emphasized. The ophthalmometric measurement of the anterior surface of the cornea is admittedly an accurate measurement, as far as it goes. But clinical procedure requires one further step, that of transforming this measurement into what constitutes the correction lens.

In other words, while the ophthalmometer furnishes the basis, and an invaluable basis, for estimating the correction cylinder, it could not heretofore corroborate the accuracy of this computed correction by means of itself.

By using correction lenses directly in connection with the ophthalmometer, for the first time in the history of ophthalmometry, Ryer and Hotaling open the way for arriving at a very close approximation not alone of the corneal but of the *total* astigmia by viewing the effect of that correction lens directly through the ophthalmometer itself.

The novelty of the Ryer-Hotaling method is attested by the Patent Office which allowed its claims after citing, but subsequently withdrawing, only one instance of any previous attempt to develop such a method. Buchman patented an attachment to an ophthalmometer for bringing

lenses before the eye by means of levers resembling those of a typewriter. It was demonstrated, however, that he had no conception of the principle of correction involved because he suggested viewing a special circular miral image through cylindrical lenses set as they would be set in the correction worn. Such a method is faulty not only because it fails to take into consideration the physiologic astigmia but it is useless because a lens placed as he suggests causes an increase instead of a reduction of the astigmia present.

The Ryer-Hotaling method, in simplest outline, consists in finding the lens, set at the wearing distance before the eye, through which the ophthalmometer registers a half-diopter of with-the-rule astigmia in meridians 180° and 90°. The lens which does this, *provided its axis be reversed* 90 *degrees*, represents the lens which corrects the *total* astigmia.

The American Journal of Optometry and Archives of The American Academy of Optometry is pleased to state that the paper dealing with this unique advancement in ophthalmometric technique is published elsewhere in this issue. Carel C. Koch.

SPECIAL REPORTS

OPTOMETRIC ETHICS AND ECONOMICS*

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Your professional fees are, and must be, of your making and we want to emphasize that there can be no desire to dictate or indicate the remuneration for your services. The object is to rationalize thinking so that the manner of establishing remuneration can be uniformly interpreted and pronounced when necessary or desirable. In order to correct the misconception of those who think that the "price of glasses" is the cost of eye care, it is desirable to establish certain basic principles which are subscribed to by the profession and can be translated into terms that the public can understand. By the public, we mean not only the patient who seeks explanation, but, equally important, we mean the Governmental agencies, including tax and regulatory bodies.

* An abridgment of the material appearing in Part One of the Professional Advancement Program of the American Optometric Association, 1943.

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So first, let's define Optometry. For this purpose we borrow a definition:

"Optometrists primarily render professional services to the eyes of their patients. Their professional services consist in part of examining and refracting eyes. Optometrists examine eyes for the purpose of determining whether or not ocular disturbances prevail, and whether or not spectacles are necessary. Therefore, optometrists are not engaged in the sale of personal property as such, but rather spectacles are consumed by them in the rendering of such professional services.

"Because a professional optometrist does include refractive knowledge and experience and/or the scientific and technical skill incident to the accurate interpreting, fitting and servicing of spectacles, it is established that the tangible value of the material involved only consists of the laboratory costs of the prescription materials. The materials are a therapeutic agency employed, when necessary, to render certain of these professional services.

"Therefore, it must be held that examining, refraction and prescribing, interpreting, fitting and servicing of spectacles as ethically performed are distinctly professional."

This definition establishes the relation of spectacles—laboratory material—to eye care and describes them as a therapeutic agency and not a commodity. Despite any existing or proposed rulings to the contrary, the following definition of ophthalmic commodities establishes the most enlightened reasoning on this subject:

"Ophthalmic commodities include all ophthalmic products which are made and sold in the form in which they were originally manufactured. They shall retain their commodity rating through to the end use, or to whatever point in their sale where they, or parts thereof, are employed in the compounding of a prescription with corrective power or focus for the individual benefit of a predetermined person."

This definition excludes corrective focus spectacles compounded for a predetermined individual from commodity classification. But ready-to-wear focus spectacles, non-focus sun glasses, non-focus protection goggles, cases when sold as such, reading magnifiers, and similar items are commodities.

There is a marked distinction between these two kinds of material. The therapeutic materials are never worth any more than their cost to the optometrist. The optometrist is the consumer of ophthalmic materials

in the consummation of his professional duties and, as a consumer, he utilizes their full value—and material that has been consumed cannot be re-evaluated for resale.

A commodity has a merchandise or package value as such, and, inasmuch as it does not demand the professional services incident to the individual's prescription, it should carry the usual commodity margin and is not the subject of this interest.

For this need, we will deal with the economics involved in visual efficiency when corrective or focus spectacles are employed and establish a process of thinking through which the cost of eye care can be evaluated. Examining, refracting and prescribing constitute a series of professional acts that may be grouped for the purpose of this consideration. They are the ministrations that culminate in a prescription, and the optometrist may or may not go beyond this with his services to the patient.

These three services establish a value for which a distinct reward must be realized. The amount of this fee is distinctly the decision of the individual practitioner and may vary according to the character of the practitioner and his professional ministrations. Also, it may vary between the individual cases, dependent upon the problems involved, time required, number of visits, degree of skill, the experience employed and the financial ability of the patient to pay. But never are these services free, except at the discretion of the doctor in deserving cases. The fee for these services is a part of the fee for complete eye care services, but may be distinct and separate if, for instance, the patient asks for his prescription and goes elsewhere for the remaining services.

The next step after the prescription is the interpreting. Interpreting is the act of translating the written prescription into materials and in such form as is required to provide the indicated needs. The interpreting may be done by the optometrist in his private laboratory; on the other hand, he may elect to have this interpreting done by another in a distributor's laboratory. If the interpreting is done by one other than the optometrist, these materials may increase in cost to the optometrist. But in either case, it must be emphasized that these values are consumed by the optometrist in his professional ministrations and represent his laboratory costs which are a part of his operating expense. In the latter case, the optometrist may carry a higher material cost than the former.

The next step is the verification of the specifications of the laboratory materials called for by the prescription. Also, and importantly,

there is the re-evaluation of the needs of the patient.

The laboratory materials were from the beginning and still are being consumed by the optometrist in the performance of his professional duties. They must now be fitted to the needs of the patient.

Survey figures indicate that the life of a pair of spectacles is about four years, during which time they should be serviced repeatedly. The continued tightening, straightening and refitting the frames to the patient's needs has long been established in the public's mind as a complimentary service. The original idea of pioneers of years ago, was that it was good practice as a courtesy that would attract patients. The idea is not compatible with good ethics or economics. We should begin to condition the public mind that such services are valuable and that a reasonable fee must be made for this service.

Thus six professional services have been established. They are:

1. *Examining to determine the presence or absence of pathology.*

2. *Refracting and visual analysis. (Determine the procedure to be followed to re-establish visual efficiency and visual comfort.)*

3. *Writing a prescription for glasses.*

4. *Consumption of the prescription materials.*

5. *Verifying, re-evaluating, and fitting.*

6. *Services incident to professional eye care for the life of the materials.*

All of the foregoing represents "a complete optometric service," except in those cases requiring orthoptic or visual training. Orthoptics and visual training have such a wide interest and are of such importance as to command separate consideration. This, we hope, will be a subject for future treatment.

An individual patient may require only services 1 and 2. He may request that the service with an individual optometrist terminate with service 3. In optometric practice the majority of those requiring a prescription prefer to have the "complete optometric service." In any event, the optometrist should terminate his services at the point requested by the patient. He should request a fee only for the value he places upon the services actually rendered. The professional optometrist charges a patient a fee, not because of any lenses, frames or other ophthalmic materials he may supply; rather because of the type and character of the service he renders. The amount of any fee charged by the professional optometrist is, generally speaking, based upon three factors:

1. *The type and character of the optometrist charging the fee.*

2. *The character of the service and the skill and knowledge involved in rendering the service.*

3. *The value of the service to the patient and his ability to pay.*

It is recognized in all professions that certain of their members can never elevate their services or fees above a certain level; on the other extreme, there are those practitioners who elevate their thinking, services, fees and environment above the normal level. They are leaders and outstanding members of each of the professional groups—Medicine, Law, Dentistry and Optometry. In between these two extremes, we have varying levels of thinking, servicing, fees and environments—many desiring and struggling to reach the same height as their leaders. This always has been true of professions. It always will be true.

"A profession has for its prime object, the service it can render to humanity; reward or financial gain should be a subordinate consideration."

The professional optometrist does exactly what the above definition, borrowed from Medicine, states. He gives his patient's welfare first consideration. This does not imply that he should not receive proper reward for his services in direct proportion to the value of his services to his patients and their ability to pay.

PROCEDURE AND INSTRUMENTATION

by Guy L. DuPlessis

A department wherein discussions will be carried on relative to the value of various experimental and clinical techniques as employed by practicing optometrists, and also in which the instruments used by optometrists in various phases of their work, will be subjected to some critical evaluation.

OPTICAL TECHNICIANS, OPTOMETRISTS AND CIVILIAN HEALTH

On December 23, 1942, General Lewis B. Hershey, Chief of the U. S. Selective Service System informed all Selective Service Boards that the War Manpower Commission had certified civilian health and welfare services as activities essential to the war effort, and that the draft status of persons engaged in such activities should, under certain circumstances, be revised.

Included in this directive is a list of critical occupations who are ordered deferred under these conditions. Among the various occupations mentioned are physicians, dentists and optometrists. Technicians having a well-rounded training as optical mechanics, are also included. By that is meant men who are familiar with every phase of prescription optical work. This directive specifies that the terms shall not include those workers who specialize in one or several of the tasks involved in lens surfacing or bench work. Well trained all-around good optical mechanics are extremely scarce and are fast becoming almost non-existent because of the trend in large prescription laboratories of having men specialize in but one task. The dispensing houses will be much relieved by this directive and are now in the position to retain, for civilian use, their few remaining well trained laboratory mechanics.

The comparative lack of opportunities for optometrists in the armed services and the resulting lack of inducement has prevented this war from making as deep inroads in the ranks of optometry as it has in dentistry and medicine. This new selective service policy regarding optometry will result in a distinct gain to the smaller cities and communities that are traditionally dependent upon optometry for their eye care.

In this, as in the last war, and it is apparently a phenomenon of all wars, optometric services have been in greater demand than ever despite the visual services performed by the army and navy specialists. Today most communities are relying on optometrists for skilled eye care and will continue to depend upon optometrists after the close of hostilities. At the present time, however, the optometrist's ability to prescribe corrections leading to visual efficiency and manual dexterity are extremely essential in our war-time production effort.

Classifications of registrants, optometric, medical or any of the 31 occupations listed as civilian health activities, must be qualified by the following considerations:

(a) "The training qualifications or skill required for the proper discharge of the duties involved in his occupation.

(b) The training, qualification or skill of the registrant to engage in his occupation; and

(c) The availability of persons with his qualifications or skills who can be trained to his qualifications to replace the registrant and the time in which such replacement can be made."

If the recommendations of the Washington Office of the Selective Service System are followed with care and impartiality it means that most communities will be assured of adequate optometric services throughout the period of the war. It also means that some communities that find themselves surfeited with a motley and superfluous aggregation of qualified optometrists who are practicing improperly may in these cities expect a readjustment of this status. In one respect, at least, the war will prove a blessing as it will no doubt result in the uprooting of those commercial practitioners, who will have a difficult time attempting to convince a lay-board-of-their-peers, of their needed professional status on the home-front.

ANISEIKONIC LENS FOR MONOLATERAL APHAKIA

The advantages of early intervention in cataract such as in the Barracquer method, are greatly offset by the aniseikonia problem. Visual acuity in the operated eye may be as good or better than that in the other eye, but correction of the monolateral aphakia results in an image some 24 percent larger than in the non-operated eye.

This difficulty has now been obviated, through the production by *Bausch and Lomb*, of a minifying lens combination, reducing the size of image in the aphakic eye to that of the other eye. This combination consists of a plastic mount, a finished objective lens and a semi-finished eyepiece lens all held in the mount by retaining rings. The optical system is in effect a reversed Galilean telescope. This combination is mounted with the objective in the plane of an ordinary round frame, thus concealing the extension of the eyepiece.

However, the nearer position of the eyepiece element requires compensation from the power previously determined in the plane of the frame, during the refraction. Therefore the prescription must include the distance of the rear trial lens and the distance of the eyepiece from the cornea when a dummy frame containing the minifying element is placed on the patient's face. The kit includes all necessary calculations for the optician to make this compensation.

The new minifying lens is not excessively unsightly and should prove a boon to those cataract cases that are operated on while still retaining fair vision in the non operated eye.

INQUIRY AND EXPLANATORY NOTES

Through this department answers to technical questions dealing with orthoptic or refractive problems will be presented. These answers here published have been prepared by competent experts. Inquiries on postal cards and anonymous communications will not be noticed.

APPLICATION OF THE PIN-HOLE DISC

To the Editor:—Kindly review the application of the pin-hole disc as an aid to the optometrist.

H. M., St. Louis, Mo.

Reply:—The pin-hole disc is an opaque plate with a small aperture, of some .75 mm. diameter, in its center. The diameter of the plate is the same as that of a trial lens. The aperture must be much smaller than the pupil, but not so small as to cause diffraction. When the aperture is placed directly in the line of vision of an eye its effect is to reduce the effective pupillary aperture.

The pin-hole disc serves to show whether defective vision is, or is not, caused by an optical defect.

When owing to an error of refraction the sight is defective the departure from normality, as expressed by a Snellen fraction, is proportional to the distance between the retina and the principal focus of the eye. Light from a point after refraction tends to a focus behind the retina in hyperopia and is brought to a focus in the vitreous in myopia.

In each case, instead of a point, the retinal image of an object point covers a definite space called a disc of confusion. This confusion disc is circular in hyperopia and myopia and generally elliptical in astigmatism. The larger the retinal confusion disc the more do they overlap and cause reduction of vision.

The pupillary aperture of the eye and the retinal confusion disc subtend similar angles at the focal point of a refracted pencil of light. The ratio of the sizes of the pupil and of the retinal confusion disc, is the same as the ratio of their distances. In a given eye the size of the retinal confusion disc depends on the size of the pupil as well as on the degree of optical error. The larger the pupil, the worse is the vision of an ametropic eye. Therefore, when the pin-hole is in the line of vision, the effective aperture of the eye is a minimum, the retinal confusion discs are diminished in size so that they overlap to a smaller degree and there is a corresponding improvement in vision, if this is reduced owing to an optical defect.

Generally, the pin-hole aperture does not raise optically reduced vision to the normal, because the retinal confusion disc, no matter how much reduced in size, is still not a point; also the illumination is very much reduced, since of the light from each point of the object, which would have passed through a normal pupil the greater part is blocked out from the eye. In all cases the improvement with lenses should be greater than with the pin-hole.

Then if sub-normal vision is improved when the pin-hole is applied it can be concluded that the defective vision is due to an optical defect and that it can be improved by lenses. An exception to this is when an optical defect is irregular. If vision is not so improved, or is made worse, the absence of clear sight results from conditions which are not optical.

The actual visual improvement varies with the way the disc is held, its distance from the eye, the brightness of the illumination, the general condition of the media of the eye and the size of the pupil.

When there is subnormal visual acuity, as in an old eye, the pin-hole is useful for the purpose of indicating what possible improvement in vision can result from lenses. It should be, at least, one line better than with the pin-hole.[1]

1. Refractionist. (London). April 16, 1929.

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

by J. Fred Andreae, Secretary

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

NELLA PARK SCIENTIST AND ACADEMY MEMBER DIES IN SERVICE

The death of Lieutenant Commander Frank K. Moss at the age of 45 is a serious loss to the world of science. He made many brilliant contributions to scientific progress during the last two decades and it is certain that he would have continued to make many more.

A native of Denver, Colorado, Comdr. Moss was born July 24th, 1898. He was graduated from the University of Colorado with degrees

of B. Sc. in 1922, and E. E. in 1926, and is survived by a sister, Mrs. Mildred M. Stadlinger, of Burbank, Calif.

Comdr. Moss enlisted in the Navy September, 1942, after 20 years in the General Electric Laboratory at Nela Park, Cleveland, Ohio. There in collaboration with Doctor Mathew Luckiesh, director of the Nela Park lighting research laboratory, he carried on extensive studies in the physiology and psychology of seeing. Together they are credited with founding "the science of seeing," and their studies led to a new understanding of the effect of lighting on the human system and laid the groundwork for many lighting developments in use in most offices and homes today. He was a frequent contributor to scientific journals, authoring over two-hundred papers. He was also in demand as a speaker before scientific bodies.

Comdr. Moss was a member of the Illuminating Engineering Society; Optical Society of America; American Society for Advancement of Society; American Academy of Optometry; and was the recipient of gold medal awards for outstanding achievements in science from the Franklin Institute and the Distinguished Service Foundation.

Before joining the Navy, he had collaborated with scientists at the Mayo Foundation and Ohio State University on defense problems, and it is certain that his death is a keen loss to scientific research in the Navy.

Funeral services were held in the Chapel at Arlington National Cemetery, Washington, D. C.

REPORT OF THE ADVISORY COUNCIL

Since the Advisory Board of the American Academy has been instituted within the last two years it might be well in offering a report of the activities of this Committee to state its function.

The function of the Advisory Council is to serve as a planning and policy screening board, each member of which is assigned one or more of the policies of service recommended in the President's Address for the purpose of formulating and planning a specific course of procedure.

During the past two years various policies have been under careful consideration, some of which have been acted upon and other policies of more far-reaching concern are still being formulated. Among the constructive plans intended to broaden Academy service are the following:

1. An investigation of the advisability of establishing a sectional congress on the West Coast. (Paine)

2. The establishment of local Academy Chapters. (Paine)

3. The use of Chapters as regional examinations centers. (Melvin)

4. Standardized visual tests for aviators and industrial workers. (Hall)

5. Sociologic Problems of Optometry. (Koch).

6. An Academy award for outstanding service in the realm of visual care. (Wheelock)

7. The feasibility of establishing a fund for the purpose of assisting newly graduate optometrists establish themselves in ethical practice in a professional environment. (Wheelock and Winslow)

8. The establishment of a Council on Professional Advancement in which the Academy's active support is given in promoting the American Optometric Association's professional advancement program. (Paine)

Several other important plans are under consideration through the joint cooperation between the President and his Executive Council and the Advisory Council.

D. R. PAINE,
CHAIRMAN OF ADVISORY BOARD,
AMERICAN ACADEMY OF OPTOMETRY.

NEW YORK ACADEMY

At the regular meeting of the New York Academy of Optometry held at the Hotel McAlpin on Feb. 16, 1943, the guests were Dr. Stack, director, and Dr. Hawkins, his associate, of the Center for Safety at New York University.

The Center is an institution concerned with the causes and prevention of accidents of all kinds. Their latest problem has been that of automobile accidents, which have increased to an alarming degree in the dimmed out streets. Dr. Stack stated that this has mounted 57% in New York City since Pearl Harbor.

A new instrument, the dimometer, which has been developed to check recognition ability was displayed prior to its delivery to the F.B.I. in Washington for demonstration and showed in a most impressive man-

ner the hazards of wartime night driving. The primary purpose of the dimometer was to awaken the public to the necessity of taking several important precautions due to the greatly reduced acuity. The speakers made a number of recommendations to the effect that the pedestrian should be more conspicuous, the driver constantly alert, and lighting conditions more efficiently controlled.

The members of the Academy were urged to use their influence to inform automobile drivers and pedestrians of their danger and to advise them accordingly.

JOHN W. MOGEY.

ABSTRACTS

A department in which will appear abstracts of the literature of optometry, ophthalmology and applied optics. These will be classified according to the following list, although contributions to all sections will not necessarily appear in each issue.

1. Ocular Refraction.
2. Physiological Optics and Color Vision.
3. Ocular Muscles.
4. Orthoptics and Reading.
5. Anatomy, Histology and Embryology.
6. Ocular and General Pathology.
7. Ophthalmic Lenses and Material.
8. Instruments.
9. Hygiene and Illumination.
10. Applied and Physical Optics.
11. Education, Sociology and Economics.
12. Miscellaneous.

1. OCULAR REFRACTION

THE "O. E. P." TECHNIQUE. H. O. Haynor. Western Optical World. 1942, 30, 5, 213.

The author, using the refracting and "typing" technique of the Optometric Extension Program, of which he claims to be familiar, examined 100 persons all between the ages of 21 and 35 years. None of these individuals used glasses and none had visual symptoms. They were, in other words, a selected group. The author found that 70 per cent of these cases "typed." 15 per cent "typed" fairly close and 15 per cent failed to "type" at all. T.O.B.

THE MEASUREMENT OF STEREOPSIS BY THE AIR CORPS AND SOME RELATED FACTS. B. E. Vodnoy. Optometric Weekly. 1942, 32, 47, 1325-1329.

The author, who is an optometrist attached to the Eye, Ear, Nose and Throat Clinic at Camp Forrest, discusses the subject of stereopsis

from the viewpoint of the Army Air Corps. He presents the various binocular tests employed and the standards set-up for Army flyers.
C.C.K.

THE TECHNICAL ASPECT OF CROSS CYLINDER REFRACTION, A. J. Rolfe. Optician. (London). 1942, 103, 2667, 225-227.

Rolfe strongly advises that the cross cylinder test follow the static skiametric refraction and that the test be made after temporarily adding —0.50 D.Sph., to the static finding which has been left in the trial frame. The author reviews the principles upon which the cross cylinder test is based. L. P.

INTEGRATIVE AND ANALYTICAL PROCEDURE. E. LeRoy Ryer and E. E. Hotaling. Optical Journal and Review of Optometry. 1942, 79, 11, 18.

The authors suggest the use of binocular tests which hold the binocular visual organism intact during the period of the test, rather than the use of dissociation tests, which they feel upset normal seeing processes. L.P.

DYNAMIC RETINOSCOPY. M. Cholerton. Dioptric Review and British Journal of Physiological Optics. (London). 1942. New Series. 2, 3, 177-183.

The author points out that from a survey of the authoritative literature on dynamic retinoscopy, the following relevant points of difference are found. (1) Confusing terminology and interpretation of the terms "lag," "accommodative lag," "physiological lag," "lag of accommodation," and "dynamic neutral." (2) Conflicting opinion on the existence of two neutral points, the low and the high neutral. (c) The conditions and methods prevailing under the tests, and (4) the distinction between the dynamic neutral and negative relative accommodation. The author discusses each of these points and makes several suggestions relative to them. He also suggests that organized serious study be given the matter by optometric societies in order that certain basic concepts may be developed. T.O.B.

ASTIGMATISM. H. B. Marton. Dioptric Review and British Journal of Physiological Optics. (London). 1942. New Series, 2, 3, 163-168.

Careful studies of the subject of astigmatism indicate that methods of correcting this visual disorder which are wholly dependent upon the estimation of the corneal defect are quite untrustworthy. The author presents evidence that the crystalline lens can be and indeed is responsible for a considerable amount of astigmatism. The author advises both objective and subjective tests in the correction of astigmatism and reviews several of these including special test charts as well as the use of the crossed cylinder tests. L.P.

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2. PHYSIOLOGICAL OPTICS AND COLOR VISION.

COLOR VISION. C. J. Wahlig. Bulletin of the Optometrical Society of the City of New York. 1942, 8, 1, 7-8.

While the author is by no means sure that color blindness can be corrected, he does seem to feel that many patients who now fail to pass standard tests for color vision, are not color blind but are deficient in color education, and for this reason he suggests training techniques to develop this visual faculty. C.C.K.

WEAK CORRECTIONS: A THEORY. L. A. Swann. Optician. (London). 1942, 103, 2669, 259-261.

Swan develops the theory of a physiologic pupilary near reflex deficiency, and explains the relief experienced by some patients in using ½ or ¼ D., spheres or cylinders to the absorption value of the lenses employed, even when these are made from ordinary white ophthalmic glass. He suggests that even greater relief can be given many patients by having these weaker corrections made in the lighter shades of absorption glass. C.C.K.

COLOR BLINDNESS AND HEREDITY. A. L. Graubart and C. H. Scholermann. The Columbia Optometrist. 1942, 16, 62, 7.

"Color blindness is not a disease but a defective sense of color. When we say that a person is color blind, that person is not correctly speaking, blind to colors. He perceives the same kind of light as the normal observer, but sees a part of it in another manner. In the system

according to which he arranges his colors, he has fewer kinds than the normal observer and this is why he is obliged to classify under the same denomination, a portion of the colors classed by the normal observer under different heads." The authors attempt to trace the surprising hereditary behavior of color blindness. In so doing they have been able to formulate the following laws. (1) A color blind man and a normal woman will have children all normal and the sons will be unable to transmit the color blindness. (2) The daughters, however, when married to normal men, will transmit the color blindness to one-half of their sons. (3) The daughters, however, if married to color blind men, will have color blind daughters, and (4) if one of these color blind daughters marries a normal man, the sons will be color blind. The daughters of this union, however, will be normal, but in turn will have color blind sons. T.O.B.

THE FUNCTION OF BINOCULAR VISION. J. Hammon. Optometric Weekly. 1942, 33, Part I, 26, 721-724. Part II, 30, 833-837.

The author presents data resulting from several laboratory experiments which lead him to believe that binocular vision is the physiological functioning of all of the ocular anatomical parts, working in unison and all motivated by one common impulse. T.O.B.

EXPLANATION OF SLEEP SYMPTOMS AT NEAR POINT. H. H. Siegel. Optometric Weekly. 1942, 33, 8, 201.

The author discusses the symptom of the eyes becoming tired and closing and the patient falling asleep while reading. He attempts to develop a hypothesis for this phenomenon, using as a background several of the animal experiments reviewed by Pavlov. L.P.

REHABILITATION OF THE COLOR BLIND. W. L. Swanson. Optometric Weekly. 1942, 33, 31, 864.

The author reviews the visual educational training program used to assist patients whose color education was faulty and who had been rejected on this account by the military forces. Colored lights and Ishihara plates were used in the training program. Three case reports are included. T.O.B.

3. OCULAR MUSCLES.

CONTACT LENSES FOLLOWING TENOTOMY IN ALTERNATING SQUINT. E. Adams. Optometric Weekly. 1942, 33, 3, 62-64.

Adams presents a case report of a patient with alternating squint of long standing. The patient being a high hyperope. Strong convex lenses brought monocular vision up to 20/25, but the patient failed to have binocular vision. After a tenotomy and several minor surgical interferences, corrected binocular vision could be established. However, the patient did not like to use strong prismatic-convex lenses, so contact lenses were made, thus improving his appearance. The patient now wears these contact lenses for average periods of from 4 to 6 hours. C.C.K.

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4. ORTHOPTICS AND READING.

THE READING PROBLEM. T. H. Eames. The Columbia Optometrist. 1942, 16, 62, 2-3.

"The eye men's research has been very helpful but it has not provided any touchstone which will prevent, cure or abolish reading difficulty. What they have done is to study and contribute to a better understanding of the part played by eye difficulties in learning. Probably the biggest contribution that eye men have made has been in bringing to the attention of teachers the fact that, although the hypermetropic child is often able to pass tests of visual acuity he does so at the expense of eye strain and that such a child tires more quickly than others in tasks requiring eye work at book or desk distances.

"Treatment of the child with difficulty in reading is a tedious but reasonably successful process. First, it is necessary to remedy any physical defects (including eye trouble) which may be present. Existing neuroses and psychoses must receive attention. Then remedial teaching is administered, taking account of the child's mental level, his non-remediable physical difficulties, his lateral dominance and his educational deficiencies. The field of remedial teaching is as distinct and important in education as is optometry or ophthalmology in the fields of medicine and public health. The major part of the treatment of reading falls to the remedial teacher and the most that medicine or optometry can do is to help smooth the way, by detecting and treating or correcting such physical handicaps to learning as may be present." C.C.K.

5. ANATOMY, HISTOLOGY AND EMBRYOLOGY.

NOTES ON THE EYELIDS. A. Barnett. Optician. (London). 1942, 103, 2669, 262-263.

Barnett presents the anatomy and physiology of the eyelids for the first aid worker. T.O.B.

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6. OCULAR AND GENERAL PATHOLOGY

CONTACT LENSES IN TRICHIASIS. E. Adams. Optometric Weekly. 1942, 32, 47, 1332-1334.

The author presents the obvious advantages in the use of contact lenses by patients who suffer from trichiasis. He also presents, in considerable detail, the report of a case with this affliction, and the ocular relief afforded this patient by the constant use of contact lenses. This patient inserts the lenses at 6:00 A.M. and wears them until 10:00 P.M. changing the solution every four hours. The above contact lenses are used for corneal protection only. C.C.K.

GLAUCOMA AND ITS VISUAL FIELD DEFECTS. J. T. Hobson. Western Optical World. 1942, 30, 4, 163-167.

The author finds that glaucoma represents from one to two per cent of all cases of ocular pathology. In all suspected or questionable cases the optometrist should make a field analysis with the perimeter and a study of the central visual field with the aid of a tangent screen. L.P.

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8. INSTRUMENTS.

THE OPHTHALMOMETER. M. Poser. The Optical Journal and Review of Optometry, 1941, LXXVIII, 17, 18-19.

Short descriptions of the following ophthalmometers are presented by the author; Javal; Reid; Hardy; C-I.; Universal; Wadsworth; Souter; Sutcliffe; A-O Micromatic; Zeiss and B & L Keratometer. C.C.K.

MINUTE MONOCULAR CENTRAL SCOTOMA. F. W. Brock. Optometric Weekly. 1942, 32, 52, 1465-1466.

Brock presents the technique and a description of the equipment needed for a new test to determine the presence of a small monocular cen-

tral scotoma. The test, using a projected image, is very refined and must be made with the greatest of care, but is of value in those cases in which the grosser perimetric, tangent screen and stereo-campimeter findings fail to show the scotoma. C.C.K.

A COMPLETE HOME-MADE PHOROPTER HEAD. Boscow, A. N. Optician, (London). 1942, 102, 2652, 329-330.

The author describes in detail (with illustrations) the steps to be taken in making a complete phoro-optometer including trial frame, Maddox rods, near-point reading bar, near-point muscle lamp, Maddox prism and Stevens phorometer. L.P.

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9. HYGIENE AND ILLUMINATION.

VISUAL EFFICIENCY IN INDUSTRY. A. M. Culler. Journal of the American Medical Association. 1941, 116, 1349.

The conservation of eyesight in industry depends upon, (1) the testing and recording of the visual acuity of the applicant, (2) the examination of the eyes of those having defective vision, (3) the proper placement of workers with defective vision, (4) proper illumination while at work with a total absence of glare, (5) employee education as to ocular hazards, (6) protection of the eyes for all those on hazardous jobs, and (7) prompt treatment for all ocular injuries. L.P.

STUDIES ON VISUAL LIMITATIONS OF DRIVERS. REPORT OF THE MOTOR VISION COMMISSION, A. O. A., 1941. E. H. Silver, Journal of the American Optometric Association, 1942, 13, 10, 296-298.

"Regardless of what may be assigned as the ultimate cause of most night accidents the immediate cause is not seeing the hazard in time. Authorities may attribute the accident to alcohol, fatigue, sleepiness or to the class of drivers operating a vehicle at night. But the fact remains . . . if you make it easy for a driver to see, you will reduce his chances of an accident by at least 50 per cent." The author suggests better headlights on motor cars and improved illumination for the highways.

T. O. B.

VISION IN THE EDUCATIONAL FIELD. T. E. Newland, Pennsylvania Optometrist, 1942, 11, 1, 31-37.

The author is Chief of the Division of Special Educational Department of Public Instruction for the State of Pennsylvania. He reviews the position of the educator and student from the standpoint of vision in the war effort, and makes the following suggestions: (1) The schools are in need of a systematic and qualified examination of the eyes and vision of all school children. (2) A controlled research program in constant progress to keep this visual examination at its highest peak of development and usefulness. (3) A reduction in the time gap between the discovery of visual impairments and the correction and adjustment of those handicaps. (4) A greater utilization on the part of schools of "sight conservation" practices; i.e., better lighting, seating, etc. (5) Better training of the teachers in sight conservation practices. (6) Better health and safety educational programs for the students, and (7) technical improvement in the reading material used by the student.

C. C. K.

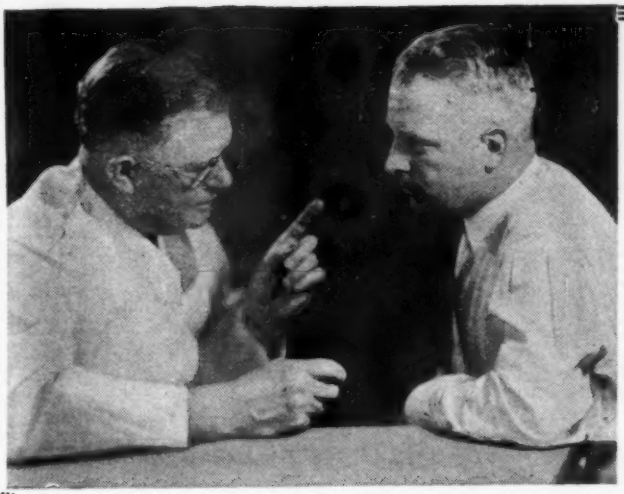
THE CITY GOVERNMENT AND EYE HEALTH CARE. W. W. Matthews, Pennsylvania Optometrist, 1942, 11, 1, 13-15.

"Without any reflection whatever on a profession which has as its principal goal the improvement of one of the most necessary sensory organs, I think its members could well devote considerably more of their efforts to the tracking down, correction and elimination of those things which make the use of glasses necessary." The author stresses the fact that it is now time for those interested in ocular problems and visual safety to coordinate their activities to give both the public and the workers in industry the highest type of professional service and care.

C. C. K.

THE STATE GOVERNMENT AND EYE HEALTH CARE. H. D. Immel, Pennsylvania Optometrist, 1942, 11, 1, 9-12.

"Although easiest of all permanent injuries to avoid, eye losses are most costly of all permanent disabilities in the Pennsylvania industrial record of compensation awarded." The author insists that strict regulation and enforcement of all safety measures are necessary to succeed in a state-wide program of eye safety and visual care. C.C.K.



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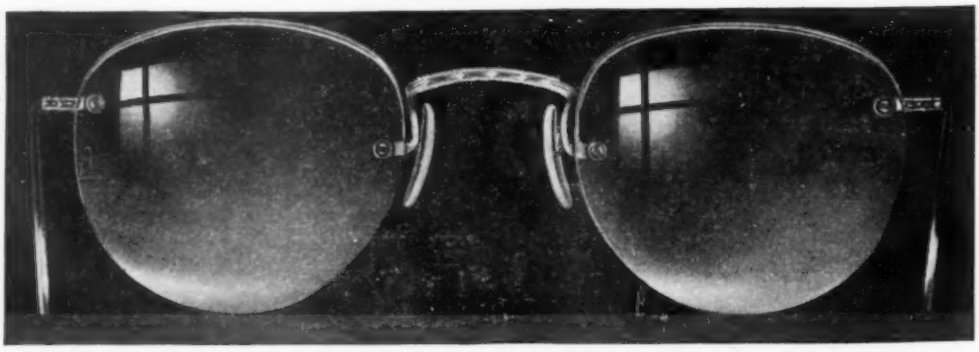

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